NDOT's Municipal Separate Storm Sewer System (MS4) Permit Training Program

Your Instructors

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Introduction: Logistics

- Sign In/Attendance Forms
- Breaks
- Restrooms
- Emergency Exits
- Classroom Etiquette

Since it “never” rains in Nevada, why do I need a stormwater permit?

Why are you here ?

- To comply with NDOT's training requirements
- To learn about stormwater permitting & how it affects NDOT & your job
- To review BMPs to use at NDOT's construction sites & maintenance yards
- To detect illicit discharges & how to eliminate them

Course Overview
Construction Sites

- Introduction to stormwater & its impacts
- Erosion process & erosion/sediment control
- Different types of permits required
- SWPPP preparation & requirements
- Construction site BMPs
- Dewatering on construction sites
- Post-construction BMPs & maintenance
- Permanent stabilization and NOTs

Course Overview
Maintenance Facilities

- Covered under a different type of permit
- Types of pollutants at maintenance facilities
- FPPP preparation & requirements
- BMPs
- Housekeeping
- Salt sheds & material stockpiles
- Illicit discharge detection & elimination
- Tour of a maintenance yard (time permitting)

Types of Stormwater

- Stormwater – Overland flow resulting from precipitation and/or snowmelt, often discharging into a receiving body of water
- Stormwater - A direct result of surface water flowing across impermeable or semi-impermeable surfaces
- Run-On – Stormwater discharges from adjacent sites onto the construction site
- Stormwater Discharges – Runoff from a construction site or maintenance facility

Acronyms & Definitions

- NDEP – Nevada Division of Environmental Protection
- EPA – U.S. Environmental Protection Agency
- CWA – Clean Water Act
- NPDES – National Pollutant Discharge Elimination System
- MS4 – Municipal Separate Storm Sewer System
- SWMP – Stormwater Management Program
- BMPs – Best Management Practices
- SWPPP – Stormwater Pollution Prevention Plan
- FPPP – Facility Pollution Prevention Plan

Summer Storm in Las Vegas

Winter Storm Event In Carson City

Result of Sediment Discharge During the Storm Event

Road From Caliente to Elgin January 2011

Stormwater Pollution Can Include:

- Soil, dirt & sediment
- Metals
- Paints & solvents
- Pesticides/herbicides
- Concrete compounds
- Asphalt compounds
- Petroleum products
- Hazardous chemicals

Facts about Stormwater Pollution

- Stormwater discharges are often the #1 source of ocean, bay, lake, and river pollution in the US
- In 2009, EPA's Assessment TMDL Tracking and Implementation System (ATTAINS) determined that 49% of assessed river and stream miles, 66% of assessed lake area and 63% of assessed bay and estuary area are impaired
- Over 100 water bodies on Nevada's 2006 303(d) List of Impaired Waters

Sediment From Stormwater Runoff

Federal Stormwater Laws & Regulations

1972 – Passed the Federal Clean Water Act

1990 – Phase I of the CWA Enacted

1992 – Nevada Became a Delegated State

1993 – Nevada Issued Its First Stormwater Permit

1999 – Phase II of the CWA Enacted

2014 – Phase III, Cooling water intakes

The goal of the CWA is to restore and maintain the chemical, physical and biological integrity of the Nation's waters

Stormwater Program Goals in Nevada

To protect the quality and beneficial uses of Nevada's surface water resources from pollution in stormwater runoff due to construction activities. To do that, NDEP uses

- Public outreach
- Regulatory compliance & enforcement

NPDES Permitting

- All facilities that discharge pollutants from a point source into *waters of the United States (WOUS)* are required to obtain an NPDES permit
- The EPA is authorized to issue NPDES permits under the CWA
- NDEP is the state authorized NPDES permitting agency
- NDEP is an agency within the Nevada Department of Conservation and Natural Resources
- NDEP's Bureau of Water Pollution Control is tasked with developing and issuing the following NPDES permits:
  - Construction stormwater permit
  - Industrial stormwater permit
  - MS4 permit

Types of Permits Required on a Construction Project

- MS4 Permit
- Construction Stormwater Permit
- Deminimus Permit (Dewatering)
- Working in Waters Permits
- U.S. Army Corps of Engineers 404 permit
- 401 Water Quality Permit
- Air Quality Permits
- Local Permits

Common Pollutants Found on NDOT Sites:

- Vehicle fluids
- Asphalt & concrete materials & waste
- Paints, solvents & thinners
- Wood products
- Sanitary waste
- Metals & plated products
- Sand blasting waste
- Waste from concrete washouts

Paints, Solvents & Thinners

Metals

Concrete Washout Waste

Sanitary Waste

Wood Products

Asphalt & Concrete Materials & Waste

Vehicle Fluids

The Largest Source of Pollution on a Construction Site is?

SEDIMENT

Construction Activities that Contribute Sediment

- Clearing & grubbing
- Mobilization of equipment
- Grading & earthwork operations
- Excavation operations
- Demolition of existing structures
- Dewatering operations
- Bridge & culvert construction
- Paving operations
- Landscaping operations

Sediment Discharge

- Blocks the transmission of light in water
- Picks up and carries metals off-site
- Increases water temperature
- Covers the fish eggs
- Decreases the dissolved oxygen level

Clogs the Gills of Fish

Erosion Process

Soil erosion is the process by which soil particles become detached by water, wind or gravity & are transported from their original location

Natural Erosion

Natural erosion Is generally considered to be due to the influence of climatic forces (wind, rain/snow & temperature) on the surface of the earth

Wind Erosion

- Most common in arid & semi-arid regions
- Can occur in any region during construction
- Occurs when wind speeds are ≥ 8-9 MPH above dry, bare ground
- Fine particles become suspended; coarser particles bounce & slide

Starts with Rainfall

- Rain drops strike the bare soil directly
  - Detaches the soil particles
  - Particles can then be transported by the water and/or wind

Sheet Erosion

- Removes a uniform thin layer of soil by raindrop splash or water run-off
- Surface film of water 1/16” – 1/8” deep
- Process may occur unnoticed on exposed soil, even though raindrops are eroding large quantities of soil
- Process eventually forms rills & gullies

Rill Erosion

- Shallow surface flows become condensed
- Increased velocity & turbulence
- Well-defined tiny channels
- Rate of rill erosion can be 100 times greater than sheet erosion

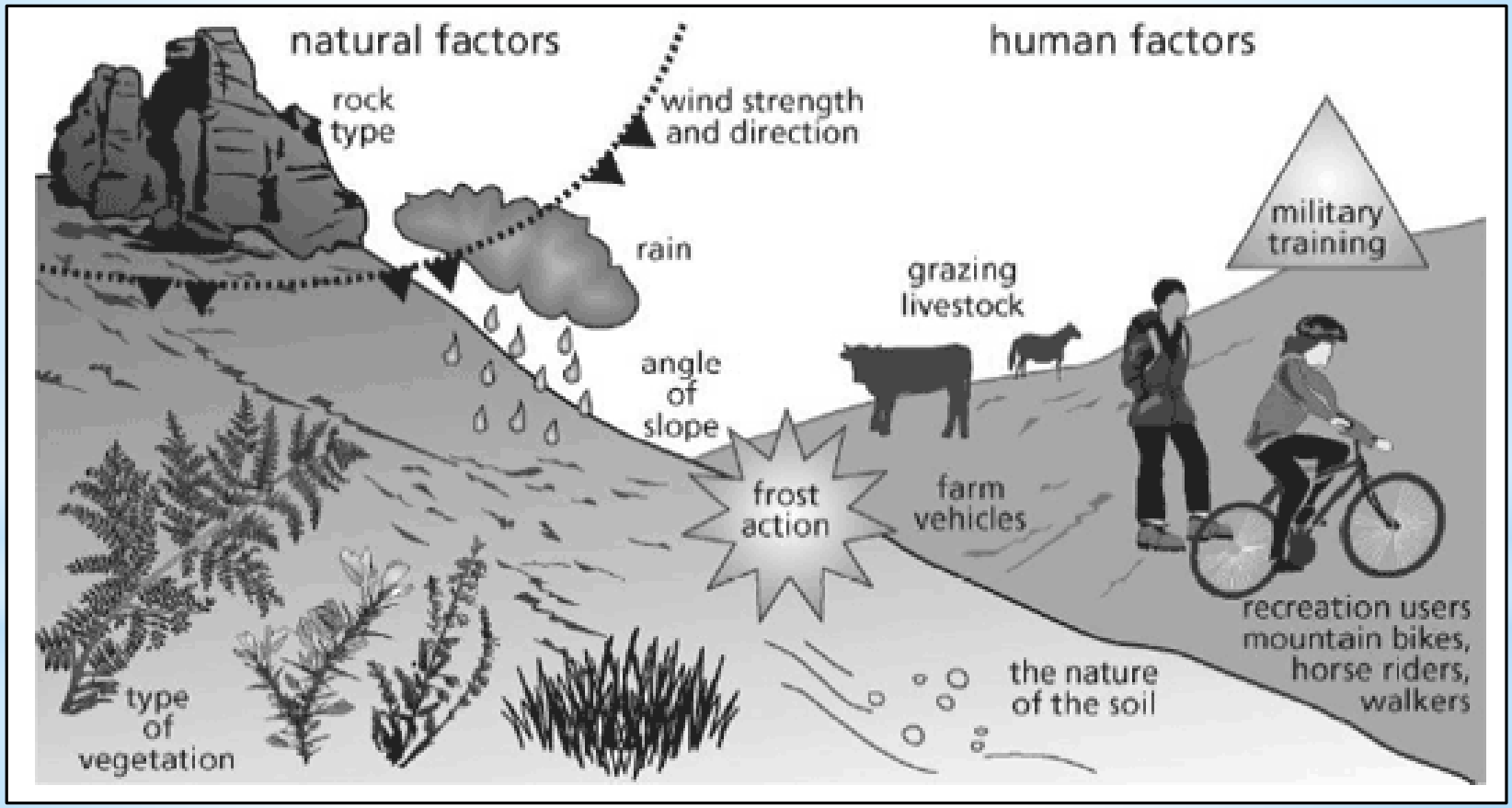
Gully Erosion

- Runoff concentrates & forms small rills
- Several rills may form throughout a slope & could then join together to form a gully
- The rate of gully erosion could be 100 times greater than rill erosion

Channel Erosion

- Results from increased volume, velocity & concentration of flow – primarily from increased impervious surfaces
- Occurs in areas where tributaries, storm drains or culverts drain into unprotected channels

Factors Contributing to Erosion



Other Factors that Accelerate Erosion

- Removal of surface cover
- Increased imperviousness that increases runoff
- Exposure of more erodible soil

Sedimentation

Sedimentation is the deposition of the eroded material

Sedimentation

Turbidity

Solid particulate matter that is in suspension while it is transported (measured in NTUs)

Turbidity

Erosion Control

Preventing erosion will minimize the amount of sediment leaving the site

Which Controls Are More Effective?

- Erosion controls are preferred as they keep the soil in place & enhance the protection of the site resources.
- Use erosion controls as the primary protection with sediment controls as a secondary system

Erosion Control

- Any practice that protects the soil surface & prevents the soil particles from being detached by rainfall, wind or human activity
- Erosion control is a source control that treats the soil as a resource that has value & should be kept in place

Sediment Control

- Any practice that traps the soil particles after they have been detached & moved by wind or water
- Sediment control measures are usually passive systems that rely on filtering or settling the particles out of the water or wind that is transporting them

Sediment Control Examples

Cut & Fill Slopes

Many stormwater violations are not the result of a storm!

Road Failure

Without controls, erosion can cause catastrophic failure of roads or other failures

Slope Failure

Goal is to prevent erosion from occurring in order to minimize sediment discharge or other catastrophic events

Ground Control Stormwater Video

Construction Stormwater Permit

Other Permits Required

Dewatering Construction Sites

- NDEP's Construction Stormwater Permit currently authorizes the pumping of 300 gpm for 30 days or less
- NDEP's DeMinimis Permit authorizes clean water discharges up to 250 gpm related to construction activities
- Discharges greater than 250 gpm need a separate NPDES discharge permit

DeMinimis Permit

- Category 4 of the permit authorizes the discharges of clean water provided the water is free from pollutants, chemicals and is not co-mingled with other wastewaters
- Discharge must be 250 gpm or less
- File an NOI and pay the annual fee

Working in Waters Permit

- This permit is required when the intent is to utilize equipment within a waterway
- Previously known as the Rolling Stock Permit
- Good for 180 days
- File the paperwork & pay the $250 fee
- Must discuss where you will be working & the BMPs you will use while working

Who Enforces the Regulations?

- NDEP is the enforcement agency for its permits
- Verbal warnings
- Written Notices of Violations
- Enforcement actions with fines

WHO MUST SEEK PERMIT COVERAGE?

Operators of construction activities that:

- Disturb one or more acres of land; or
- Disturb less than one acre but the site is part of a larger common plan of development or sale whose total land disturbing activities total one acre or greater (or is designated by the NPDES permitting authority); and
- Discharge storm water runoff from the construction site to an MS4 or waters of the U.S.

Who Is An Operator?

- An Operator:
  - Maintains Overall Operational Control Over Construction Plans & Specifications, Including the Ability to Change Those Plans;

    ….or….
  - Maintains Day-to-Day Operational Control Over Activities Which Will Ensure Compliance with the SWPPP

NDOT is the “Owner” of the Construction Stormwater Permit; the Contractor is the “Operator” of the Permit

To Obtain Permit Coverage

The Operator(s) of an NDOT construction project must:

- Develop a SWPPP p<u>rior to submitting the Notice of Intent (NOI)</u>
- Complete and submit an NOI at least two (2) days prior to commencing construction activities
- Reference the NDOT contract number in the NOI project title
- Send NDEP the $200 fee & signed confirmation page
- RE needs to retain a copy of the signed NOI

Recommendations When Starting a New Project

- Take pictures along the site before moving any dirt as it helps with the Notice of Termination (NOT)
- Stockpile topsoil for later use to aid in permanent Stabilization of the site

NDOT SWPPP Scoresheet

- Project Categorization
  - No impacts – SWPPP developed by contractor
    - Less than 1 acre soil disturbance
    - No discharge to Waters of the US
  - Low impacts– SWPPP developed by contractor
    - Minimal soil/ground disturbance
    - Low potential for sediment discharge into Waters of the US
  - Medium impacts– SWPPP developed by contractor
    - Moderate soil/ground disturbance
    - Potential for sediment discharge into Waters of the US
    - Construction lasting less than 2 years
  - High impacts– BMPs approved by a Nevada Civil PE
    - NDOT may specify BMPs
    - Major soil/ground disturbance
    - High potential for sediment discharge into Waters of the US
    - Construction typically lasts more than 2 years

SWPPP Requirements

- Project name & location
- Permittee information
- Contact information
- Person responsible for SWPPP implementation
- A description of the construction activity

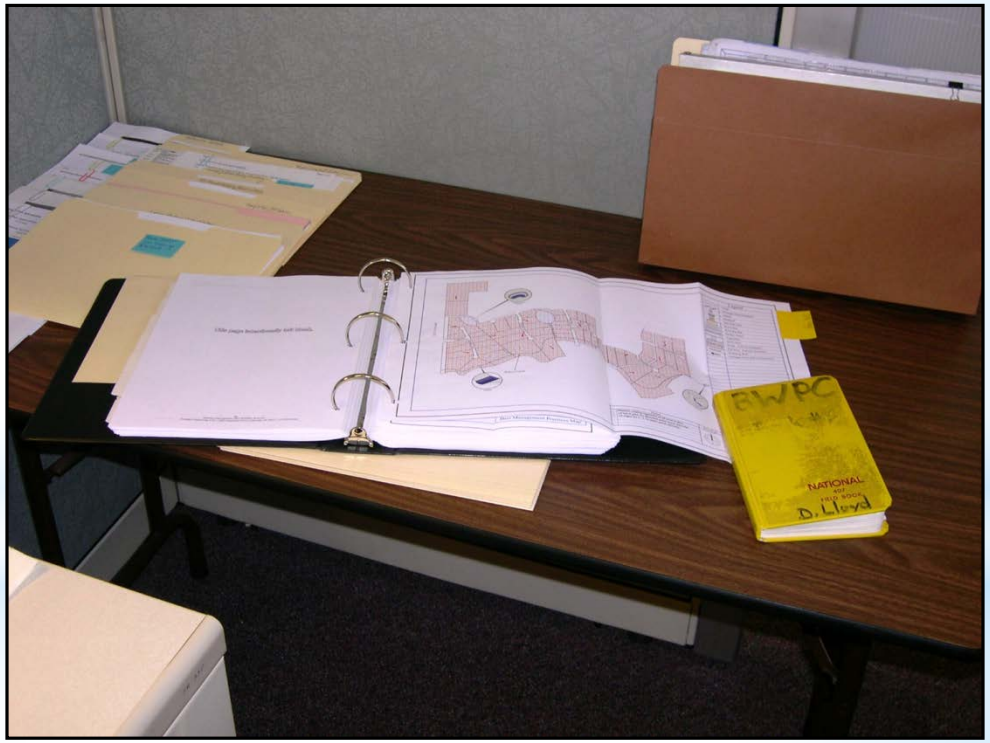
SWPPP Requirements

- NPDES permits require preparation of a SWPPP for construction activities greater than 1 acre. The purpose is to:
  - Identify potential pollutant sources that may affect the quality of discharges associated with construction activity
  - Identify non-stormwater discharges
  - Design and implement BMPs to prevent or reduce to the maximum extent practicable the entry and discharge of pollutants into waterways

SWPPP Info

- SWPPP is considered a “living document”
- SWPPP is updated weekly
- Amended when:
  - When change in construction or operations which may affect the discharge of pollutants to surface waters
  - If the General Permit is violated or the general objective of reducing or eliminating pollutants in stormwater discharges has not been achieved

SWPPP Should Be Kept in a 3-Ring Binder On-Site



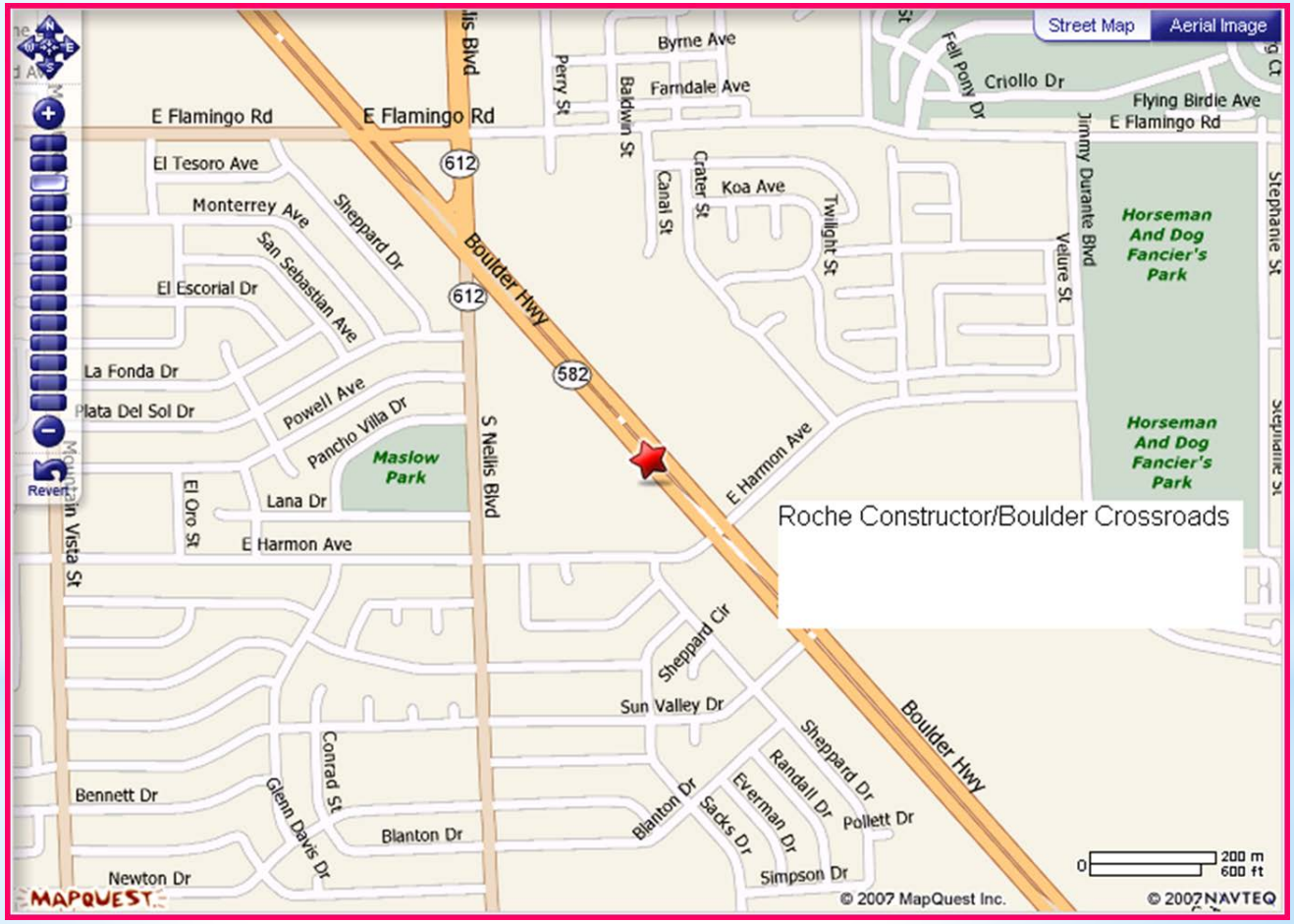
SWPPP Requirements

- Estimates of total permitted area & the disturbed soil area (DSA)
- A description of the intended sequence of major soil disturbing events
- Estimate of runoff coefficient pre/post construction
- Name of the receiving water(s)
- General location map

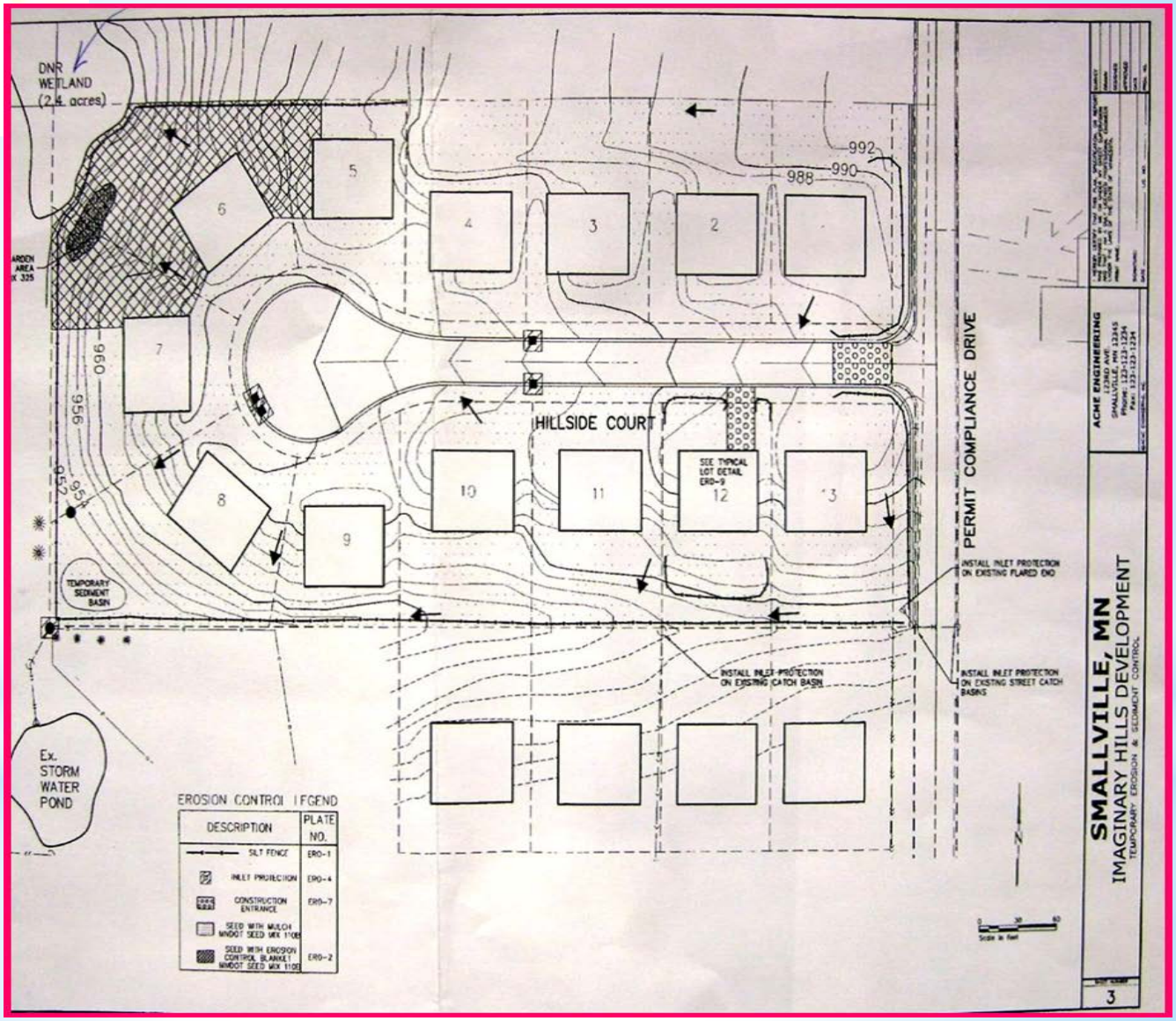
Site Map Should Show:

- Drainage patterns & approximate slopes
- DSAs
- Locations of major structural & nonstructural controls identified in the plan
- Locations where stabilization practices are to occur
- Location of site material, waste borrow & equipment storage areas
- Location of all surface waters (including wetlands)
- Locations where stormwater discharges to a surface water

Location Map



Project Site Map



More SWPPP Requirements

- A description of appropriate control measures that will be implemented as part of the construction activity to control pollutants in stormwater discharges
- State the general timing (or sequence) during the construction process that these measures (i.e. BMPs) will be implemented

More SWPPP Requirements

- A description of construction and waste materials expected to be stored on-site with updates as needed
- A description of good housekeeping procedures that will be followed to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to stormwater and spill prevention and response procedures (spill kits and their locations)

303(d) List and TMDLs

If a construction site discharges to a water body on Nevada's 303(d) List or a water body with an established TMDL, the SWPPP must also Include a demonstration that the selected BMPs will be sufficient to ensure that the discharges will not cause or contribute to an exceedance of an applicable Nevada water quality standard

Signing the SWPPP

- The General Permit requires that authorized representative(s) of the operator(s) sign & certify the SWPPP
- Authorized signatures need to be of a corporate officer or other upper-management level person
- Permittee needs to be aware that the Clean Water Act (Section 309) provides for significant penalties where information is false or violates the permit requirements

Inspection & Maintenance Plan

- A description of procedures to maintain in good condition & effective operating condition:
  - Vegetation
  - Erosion & sediment control measures
  - Other protective measures identified in the SWPPP
  - Provide for qualified personnel to perform required site inspections
  - Assure that inspection documentation is incorporated into the SWPPP

Where to Find the Construction Permit

The Link to the Construction Stormwater General Permit:

http://ndep.nv.gov/bwpc/storm_cont03.htm

- Website also has information on:
  - Various stormwater manuals
  - A SWPPP template
  - Fact sheets about the permit

Questions or Comments?

QUIZ #1

Stormwater Discharge Inspections

Inspector Certification

- Certifications will be required for Stormwater Inspectors
- The MS4 Permit, Section III.F.2., requires NDOT to implement an Employee Storm Water Training Program
- Once certified, he/she is required to attend a refresher course every 3 years.

Inspector Certification

- Only certified inspectors will be allowed to complete the Site Discharge Form 040-054A
- This certification program will need to be in compliance by March 1, 2012
- The updated form (040-054A) went into effect on April 30, 2014

Stormwater Inspections

- Inspectors should have an understanding of the BMP items and areas of placement prior to the beginning the project
- Photo documentation should be achieved prior to disturbances
- Form 040-054 should be completed weekly from the first installation to final stabilization or Relief of Maintenance

Inspection Form 040-054A

Effective April 30,2014

NEVADA DOT

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

Weekly NDOT Construction Site Discharge Inspection Checklist

Report No:

Instructions: When possible, conduct the inspection in the presence of the Contractor's designated Water Pollution Control Manager and discuss your observations. Ask clarifying questions when needed. Before inspecting the site, complete the Site Information and Site Conditions sections. Request a copy of the Stormwater Pollution Prevention Plan (SWPPP) and answer Questions 17 - 78. If a response to Questions 17 - 78 is "NO", provide a brief description of the deficiency or issue in the "Comments Section" at the end of this form. Be sure each comment includes a recommended corrective action, if appropriate, and the Question ID No. for reference. Digital photographs are to be taken during the inspection and inserted into this document for archiving. If a question is not applicable to the site mark "N/A". Non-stabilized areas disturbed by construction activities that discharge into a perennial waterway, impaired, or Total Maximum Daily Load (TMDL) listed waterway either directly or via storm sewer system, shall have inspection priority.

Question No.	Site Information
1	Project Name:
2	Contract Number:
3	Stormwater General Permit Number:
4	Contractor (Primary):
5	NDOT Inspector / Crew Number:
6	Resident Engineer:
7	Contractor's Water Pollution Control Manager:
8	Date & Time of Inspection:
9	Date of Last Inspection:
	Site Conditions
10	Weather Conditions (check appropriate): ◯ CLEAR ◯ PARTLY CLOUDY ◯ OVERCAST ◯ RAIN
11	Rain Intensity (check appropriate): ◯ NONE ◯ LIGHT ◯ MODERATE ◯ HEAVY
12	Precipitation Event Total:
13	24-hour Precipitation Total:
14	Wind: ◯ NONE ◯ LIGHT ◯ MODERATE ◯ HEAVY
15	Temperature Range (°F) ◯ <32 ◯ 32-50 ◯ 51-75 ◯ >75
16	Does stormwater discharge into an impaired or TMDL listed waterway, either directly or via storm sewer system? ◯ YES ◯ NO
	SWPPP Elements
17	Is the SWPPP onsite & available? ◯ YES ◯ NO
18	Is the SWPPP signed and certified? ◯ YES ◯ NO
19	Is the SWPPP current? ◯ YES ◯ NO
20	Have deficiencies identified during past inspections been corrected? ◯ YES ◯ NO
	Best Management Practice (BMP) Categories
	Perimeter BMPs
21	Is perimeter vegetation buffer intact? ◯ N/A ◯ YES ◯ NO
22	Are run-on BMPs intact and functioning? ◯ N/A ◯ YES ◯ NO
23	Are perimeter control BMPs properly installed and functioning? ◯ N/A ◯ YES ◯ NO
	Track-Out Controls
24	Are track-out control BMPs properly installed and functioning? ◯ N/A ◯ YES ◯ NO
25	Are track-out controls properly maintained? ◯ N/A ◯ YES ◯ NO
26	Are ingress/egress areas free of tracked materials? ◯ N/A ◯ YES ◯ NO
	Erosion Control
27	Have soils been disturbed? (estimate total area) ◯ YES ◯ NO
28	Is the site free of erosion (rill, sheet, or gully)? ◯ YES ◯ NO
29	Are erosion control BMPs properly installed and functioning? ◯ N/A ◯ YES ◯ NO
30	Are erosion control BMPs effective? ◯ N/A ◯ YES ◯ NO
31	Are erosion control BMPs properly maintained? ◯ N/A ◯ YES ◯ NO
32	Are additional or different erosion control BMPs needed/required? ◯ N/A ◯ YES ◯ NO
33	Are stockpile BMPs properly installed/implemented and functioning? ◯ N/A ◯ YES ◯ NO
34	Are stockpile BMPs effective? ◯ N/A ◯ YES ◯ NO
35	Are stockpile BMPs properly maintained? ◯ N/A ◯ YES ◯ NO
	Sediment Control
36	Are sediment control BMPs properly installed and functioning? ◯ N/A ◯ YES ◯ NO
37	Are sediment control BMPs effective? ◯ N/A ◯ YES ◯ NO
38	Are sediment control BMPs properly maintained? ◯ N/A ◯ YES ◯ NO

	Illicit Discharge Detection and Elimination (IDDE) Measures			
39	Is the site free of illicit discharges (note locations in Comment Section)?		YES	NO
40	Are stormwater drainages free of stains, odors, sheens, etc.?		YES	NO
	Concrete Washouts			
41	Are concrete washouts needed?		YES	NO
42	Do concrete washouts have adequate signage?	N/A	YES	NO
43	Are concrete washouts properly installed and functioning?	N/A	YES	NO
44	Are concrete washouts properly maintained?	N/A	YES	NO
	Chemical Storage			
45	Are vehicle fluids, paints, oils, lubricants, etc. properly stored (covered and/or contained)?	N/A	YES	NO
	Material Delivery and Storage			
46	Are construction material storage areas neat and orderly?	N/A	YES	NO
	Equipment/Vehicles			
47	Are vehicles/equipment free of fluid leaks?	N/A	YES	NO
48	Is the site free of evidence of leaking equipment?		YES	NO
49	Are equipment/vehicle maintenance BMPs properly implemented and functioning?	N/A	YES	NO
50	Are waste fluids properly stored and disposed?	N/A	YES	NO
51	Are fueling area BMPs properly implemented and functioning?	N/A	YES	NO
52	Are spill containment kits available?	N/A	YES	NO
53	Is the fueling area free of leaks or spills?	N/A	YES	NO
54	Are equipment/vehicle cleaning BMPs properly implemented and functioning?	N/A	YES	NO
	Waste Material Storage			
55	Are waste materials properly stored (covered, contained, etc.)?	N/A	YES	NO
56	Are waste materials properly disposed?	N/A	YES	NO
	Sanitation Facilities			
57	Are portable toilets located away from stormwater drainages?	N/A	YES	NO
58	Are portable toilets properly anchored to prevent toppling?	N/A	YES	NO
59	Are portable toilets properly maintained?	N/A	YES	NO
	Stormwater Runoff Discharges			
60	Is stormwater runoff being discharged from the construction site?		YES	NO
61	Is the stormwater discharge free of sediment, odor, sheen, foam, trash, etc.?	N/A	YES	NO
62	If present, describe discharge:			
63	If dry, are outfalls/discharge points from the construction area free of sediments or signs of illicit discharges?		YES	NO
	Temporary Batch Plant Area			
64	Is plant located away from stormwater drainages and waterbodies?	N/A	YES	NO
65	Are BMPs implemented to contain and/or treat stormwater runoff?	N/A	YES	NO
66	Are BMPs properly installed and functioning?	N/A	YES	NO
67	Are BMPs effective?	N/A	YES	NO
	Final Soil Stabilization			
68	Are there areas ready for final stabilization that have not yet received final stabilization treatment?	N/A	YES	NO
69	Is final stabilization intact and effective?	N/A	YES	NO
70	Are areas treated with final stabilization free of erosion (rill, sheet, or gully)?	N/A	YES	NO
	Non-Stormwater Questions			
71	Is the site free of dewatering activities?		YES	NO
72	If not, where is water discharged?			
73	Does discharge appear to be free of sediment and other contaminants?	N/A	YES	NO
74	Does Contractor have De Minimis Discharge Permit?	N/A	YES	NO
75	Does Contractor have a Temporary Working in Waterways Permit?	N/A	YES	NO
76	Is dust control needed?		YES	NO
77	Is dust control performed?	N/A	YES	NO
78	Are dust control measures effective?	N/A	YES	NO
	Final Check			
79	Were all disturbed areas inspected?		YES	NO

Identify areas not inspected and why no inspection made:

Comment Section

For each "NO" responses to Questions 17 - 78 provide a written description of the deficiency or issue. Include a recommended corrective action, if appropriate, and the Question ID No., for reference.

Were the results of this inspection provided to the Contractor? ◯ YES ◯ NO

Construction Crew Inspector

District Water Quality Section Inspector

Resident Engineer

NDOT
040-054
Rev. 04/14

Distribution: Construction, Resident Engineer, District, Contractor

Form 040-054A

- The following language will be added to the Standard Specifications:
  - *"A Storm Water Pollution Prevention Plan (SWPPP) will be developed and implemented, including documented stormwater inspections once every 7 calendar days and within 24 hours of a storm event 0.5" or greater, regardless of Construction Stormwater General Permit NVR100000 procurement."*

Form 040-054A

- All deficiencies identified on Form 040-054A require comment including a description and the location of the deficiency
- Comments for corrected deficiencies will be identified on this form on the following inspection
- Operators are required to show intent to correct deficiencies within 24 hours and complete correction within 7 days

Form 040-054A

- This form has a distribution list on the bottom of the form that must be followed after acquiring the following signatures:
  - Contractors, Water Pollution Control Manager *(Does not apply to construction permits that have gone through the NOC process)*
  - Certified NDOT Inspector
  - Resident Engineer or Maintenance Supervisor

Inspection Frequency

- Permittee must have the site inspected at least once every seven (7) calendar days and
- Within 24 hours of the end of a storm event of 0.5 inches or greater

Inspector's Duties

- Inspect:
  - DSAs of the construction site that are not fully stabilized
  - Areas exposed to precipitation that are used for storage of materials
  - Structural control measures
  - Locations where vehicles enter/exit the site

Scope of Inspections

- Must look for evidence of, or the potential for, pollutants entering the drainage system
- Observe sediment and erosion control measures identified in the SWPPP to ensure that they are operating correctly
- Where discharge locations or points are accessible, inspect to ascertain whether sediment and erosion control measures are effective in preventing significant impacts to receiving waters

Scope of Inspections

- Where discharge locations are inaccessible, inspect nearby downstream locations to the extent that such inspections are practicable
- Inspect locations where vehicles enter or exit the site for evidence of offsite sediment tracking
- All BMPs and areas inspected and their condition must be documented in the inspection report
- All installations must meet the standards of the NDOT BMP Manual

Top Compliance Issues

- Too much soil exposed at one time
- Missing and/or misunderstood BMPs
- Poor management of temporary stockpiles
- Inadequate BMP maintenance
- No BMPs for vehicle trackout
- Improper solid or hazardous waste management
- Dewatering and other pollutant discharges
- Poorly managed washouts
- Inadequate self-inspections
- Inadequate maintenance of the SWPPP

Critical Inspection Items

- Runoff control areas
- Bare soil or disturbed areas
- Stabilized areas
- Construction site entrances/exits
- Sediment in the streets
- Housekeeping measures
- Discharge points

Protect sensitive areas by fencing around the perimeter

Can use fencing around the site perimeter to designate the construction area

Maintenance BMP Inspections

- Maintenance BMP inspections should start once Relief of Maintenance is granted and the NOC is in-place
- Maintenance BMP Inspections should end once the Notice of Termination has been approved by NDEP

NOTE: Notice of Termination will not be approved until 70% re-vegetation or permanent stabilization has been achieved

Construction Site BMPs

- The BMPs Should Be Designed to Retain Sediment On-Site to the Maximum Extent Practicable (MEP)
- All BMPs Must Be Properly Selected, Installed & Maintained in Accordance with the Manufacturer's Specifications & Good Engineering Practices

Soil Stabilization BMPs

- SS-3 Hydraulic Mulch
- SS-4 Hydroseeding
- SS-5 Soil Stabilizer/Dust Palliatives
- SS-7 Geotextiles, Plastic Covers & Erosion Control Blankets/Mats
- SS-10 Outlet Protection/Velocity Dissipation Devices
- SS-13 Wind Erosion Control

Inspecting SS BMPs

- Adequate coverage of disturbed areas
- Look for holes, tears, or bare areas in cover materials
- Use a tackifier if specified in the SWPPP
- Trackout of materials
- Damage to cover materials from wildlife
- Direct contact with soil & erosion underneath

SS-3 Hydraulic Mulch

Consists of applying a fiber matrix and stabilizing emulsion or tackifier with hydro mulching equipment.

SS-3

- Limitations
  - Can be short-lived
  - Generally need 24 hours to dry

- Inspection
  - Unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked
  - Complete coverage including depressed or protruding areas
  - Mulch overspray

Incomplete Coverage

SS-4 Hydroseeding

Consists of applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment

SS-4

- Limitations
  - Steep slopes difficult to protect with temporary seeding
  - Insufficient seed to soil contact
- Inspection
  - Complete coverage including depressed or protruding areas
  - Mulch overspray
  - Fertilizer in pelleted or granular form
  - Failed areas are reseeded, fertilized, and mulched within the planting season using not less than half the original application rate

SS-5 Soil Stabilizer/Dust Palliatives

- Soil stabilizers are applied to exposed or disturbed soil to reduce wind and water erosion, during or after construction activity
- Dust palliatives are used during construction to reduce dust emissions due to mechanical and wind forces

SS-5 Limitations

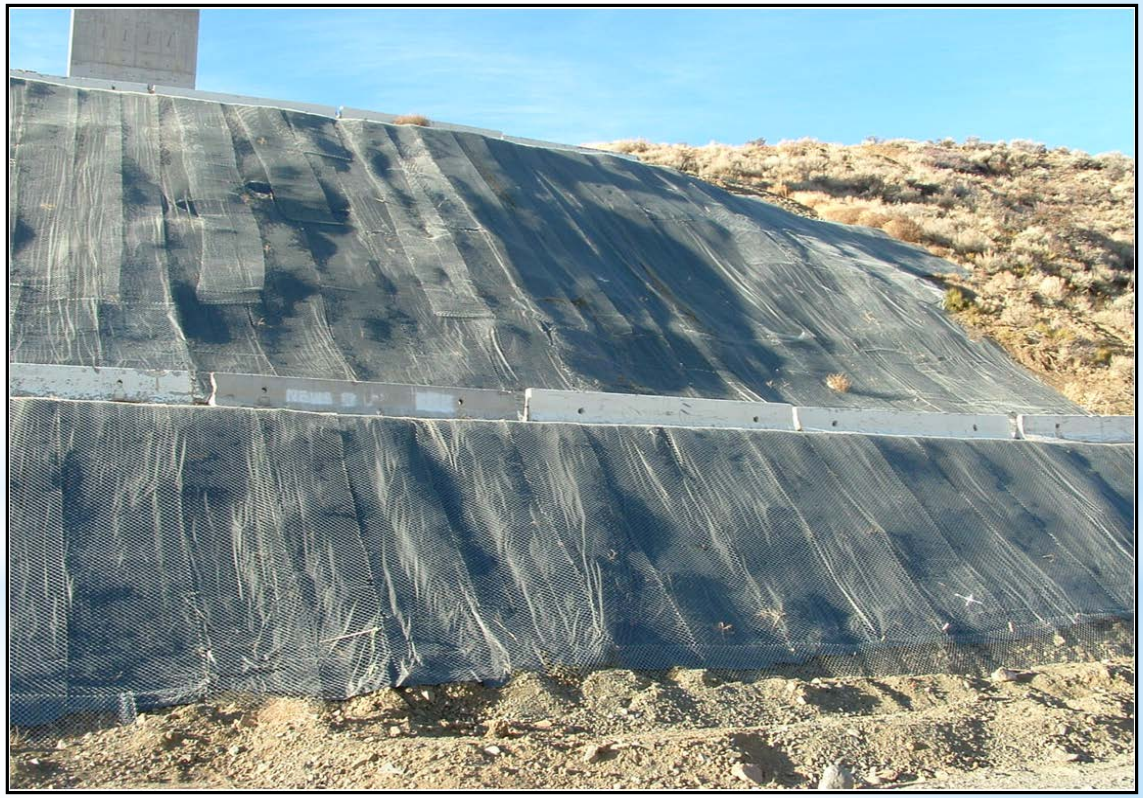
- Curing time of 24 hours or greater
- May not cure in lower temperatures
- May need regular reapplication
- Do not hold up to pedestrian or vehicle traffic
- May undercut at top of slope
- May not be effective in areas made up primarily of silt and clay

SS-5 Inspections

- Inspect
  - Soil stabilizers should not be applied during or immediately before rainfall, to frozen soil, areas with standing water, or when the air temperature is below 40F during the curing period
  - Complete coverage including depressed or protruding areas
  - Mulch overspray
  - Unbroken ground cover
  - Undercutting at top of slopes

Geotextiles, Plastic Covers & Erosion Control Blankets/Mats

Used to temporarily stabilize DSAs & protect soils from erosion by wind or water



SS-7 Limitations

- Not suitable for excessively rocky sites
- Non-degradable fabrics must be removed when permanent stabilization measures are ready to be installed
- Plastic results in 100% runoff
- Maximum flow rate limitations

SS-7 Inspections

- Secured in place, generally using u-shaped wire staples, metal geotextile stake pins or triangular wood stakes to anchor mats and blankets
- Blankets unrolled downslope & the edges are overlapped
- Blankets or mats have direct contact with soil
- Look for undercutting at the top of slopes, undermining, erosion, and anchorage failure

SS-10 Outlet Protection/Velocity Dissipation Devices

Placed at pipe outlets to prevent scour and reduce the velocity and energy of exiting storm water flows

SS-10

- Limitations
  - Washout during high flows
- Inspection
  - Check for scour beneath the riprap and around the outlet

Proper Installation of Outlet Protection

Lack of Outlet Protection

SS-13 Wind Erosion Control

Applying water, soil stabilizers, dust palliatives, or other soil stabilization BMPs to prevent dust nuisance

Tackifier

SS-13

- Limitations
  - Effectiveness depends on soil, temperature, humidity and wind velocity
- Inspection
  - Coverage of protected areas

Sediment Controls

- Capture/Contain sediment to prevent it from leaving the site
- BMP generally is some type of basin/trap or runoff control
- Runoff water is collected and stored to allow sediment to settle prior to discharge

Sediment Control BMPs

- SC-1 Silt Fence
- SC-2 Sediment Basin
- SC-3 Sediment Trap
- SC-4 Check Dam
- SC-5 Sediment Logs
- SC-6 Gravel Bag Berm
- SC-8 Storm Drain Inlet Protection

SC BMP Inspections

- Erosion around inflow and outflow points
- Slope and embankment stabilization
- Sediment accumulation
  - Build-up equaling ½ the depth of the basin/trap
  - Sediment accumulation greater than 1/3 capacity of BMP
- Presence of obstructions, clogging and improper drainage
- Inlet protection

SC-1 Silt Fence

SC-1 Limitations

- Not used in concentrated flow areas
- Maximum length of slope draining to any point along the silt fence shall be 200 ft
- Slope of area draining to fence less than 1:1

SC-1 Inspections

- Silt fence trenched and keyed in
- 10 ft. set back from toe of slopes
- Undercut, split, torn, slumping or weathered fabric
- Sediment accumulation greater than 1/3 of fence height

Silt fence

Silt Fence

Silt Fence

Silt Fence

Silt Fence

Silt fence can contain lots of sediment if properly installed & maintained!

SC-2 Sediment Basin

Temporary basin formed by excavation or constructing an embankment for sediment to settle out before the runoff is discharged

SC-2 Limitations

- Requires large surface areas to settle sediment
- Recommended for a 5-10 acre drainage area with a maximum of 75 acres
- Not to be located in live streams

SC-2 Inspections

- Seepage and structural soundness
- Inlet and outlet structures and spillway for any damage or obstructions
- Inlet and outlet area for erosion
- Accumulated sediment has exceeded 50% of design capacity
- Damage to fencing

SC-3 Sediment Trap

Temporary containment area formed by excavation or constructing an embankment for sediment to settle out before the runoff is discharged

SC-3 Limitations

- Requires large surface areas for infiltration and/or settling of sediment
- Not appropriate for drainage areas greater than 5 acres
- Does not remove fine-sized particles
- Can require protective fencing
- Not to be located in live streams

SC-3 Inspections

- Seepage and structural soundness
- Outlet structure and spillway for any damage or obstructions
- Outlet area for erosion
- Accumulated sediment has exceeded 50% of design capacity
- Water infiltrated or dewatered within 72 hours
  - 7-day maximum dewatering time during summer months (April-September)
- Damage to fencing

Sediment Trap

SC-4 Check Dams

Device constructed of rock, gravel bags, sediment logs, or reusable products placed across a natural or man-made channel or drainage ditch

SC-4 Limitations

- Not to be used in live streams
- Placed in small open channels that drain 10 acres or less
- Not to be used in grass lined channels, unless erosion of channel is anticipated
- Can require extensive maintenance
- Trapped sediment can be re-suspended
- Not to be constructed from a silt fence

SC-4 Inspections

- Gravel bags should not be stacked any higher than 3 feet
- Damage to dam
- Sediment depth less than 50% of the check dam height

Rock Check Dams

Short Circuiting

Rock Check Dams

SC-5 Sediment Logs

Placed on the toe and face of slopes to intercept runoff and reduce its flow velocity

SC-5 Limitations

- Runoff and erosion may occur if sediment log is not adequately trenched in
- Limited sediment capture zone
- Difficult to move once saturated

SC-5 Inspections

- Sediment logs at the toe of slopes greater than 2:1 shall be a minimum of 20-in. diameter or installations achieving the same protection (e.g. properly secured stacked smaller diameter sediment logs)
- Split, torn, unraveling, or slumping sediment logs
- Sediment accumulation less than ¾ of the barrier height

Sediment Logs

Sediment logs properly staked and trenched

Sediment Logs

Sediment Logs

Sediment Logs

Redundant BMPs

SC-6 Gravel Bag Berm

Forms a barrier across a slope to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide some sediment removal

SC-6 Limitations

- Degraded gravel bags may rupture when removed
- Limited durability for long-term projects
- Frequent maintenance when used to detain concentrated flows

SC-6 Inspections

- Accumulated sediment less than 1/3 of the berm height
- Torn bags

Gravel Bag Berms

SC-8 Storm Drain Inlet Protection

Devices settle and filter sediment prior to discharge into storm water drainage systems or watercourses

SC-8 Limitations

- Sediment removal difficult in high flow conditions
- Frequent maintenance
- Drainage area 1 acre or less

SC-8 Inspections

- Filter fabric fence inlet protection for flows not exceeding 0.5 ft^3/s
- Gravel bag barrier inlet protection for flows exceeding 0.5 ft^3/s, allow for overtopping to prevent flooding
- Sediment logs not used
- Foam barriers anchored
- Accumulated sediment less than 1/3 height of filter fabric fence or gravel bag barrier
- Accumulated sediment less than ½ height of excavated drop inlet sediment trap

Storm Drain Inlet Protection

Storm Drain Inlet Protection

Storm Drain Inlet Protection

Tracking Control

TC-1 Stabilized Construction Approaches

A construction ingress/egress point that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles

NEVADA DOT

TC-1 Inspections

- Vehicle speeds less than 15 mph on all unpaved routes and parking areas
- No runoff flowing onto paved roads
- Runoff routed through a sediment-trapping device before discharge
- Gravel pad(s) approximately 15 ft. wide, 6 in. deep, and 50 ft. long, or length of longest haul truck
  - 1 in. rough diameter, clean, well graded gravel and crushed rock
- Gravel not clogged with sediment
- Temporary roadway ditches clear

Trackout Control

Trackout Control

Trackout Control

Street Sweeping

WM-3 Stockpile Management

Place sediment logs around the berm to prevent sediment from leaving the site

WM-6 Concrete Waste Management

- Need to properly dispose of concrete waste
- Use commercial washout units or make a temporary washout unit that can be disposed of when full
- Washouts do not need to be lined – unless there is high groundwater at the site

Concrete Washouts

Concrete Washouts

Secondary Containment

Secondary Containment

Maintenance of BMPs

- If the BMP is not operating as designed
- If the capacity of BMP has been reduced by 50%
- Sediment must be removed from sediment traps or sediment basins when design capacity has been reduced by 50%

Housekeeping

Proper Housekeeping

Proper Housekeeping

Stabilization Practices

- The SWPPP <u>must</u> include a description of interim and permanent stabilization practices for the site, including a schedule of when the practices will be implemented.
- Site plans should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized

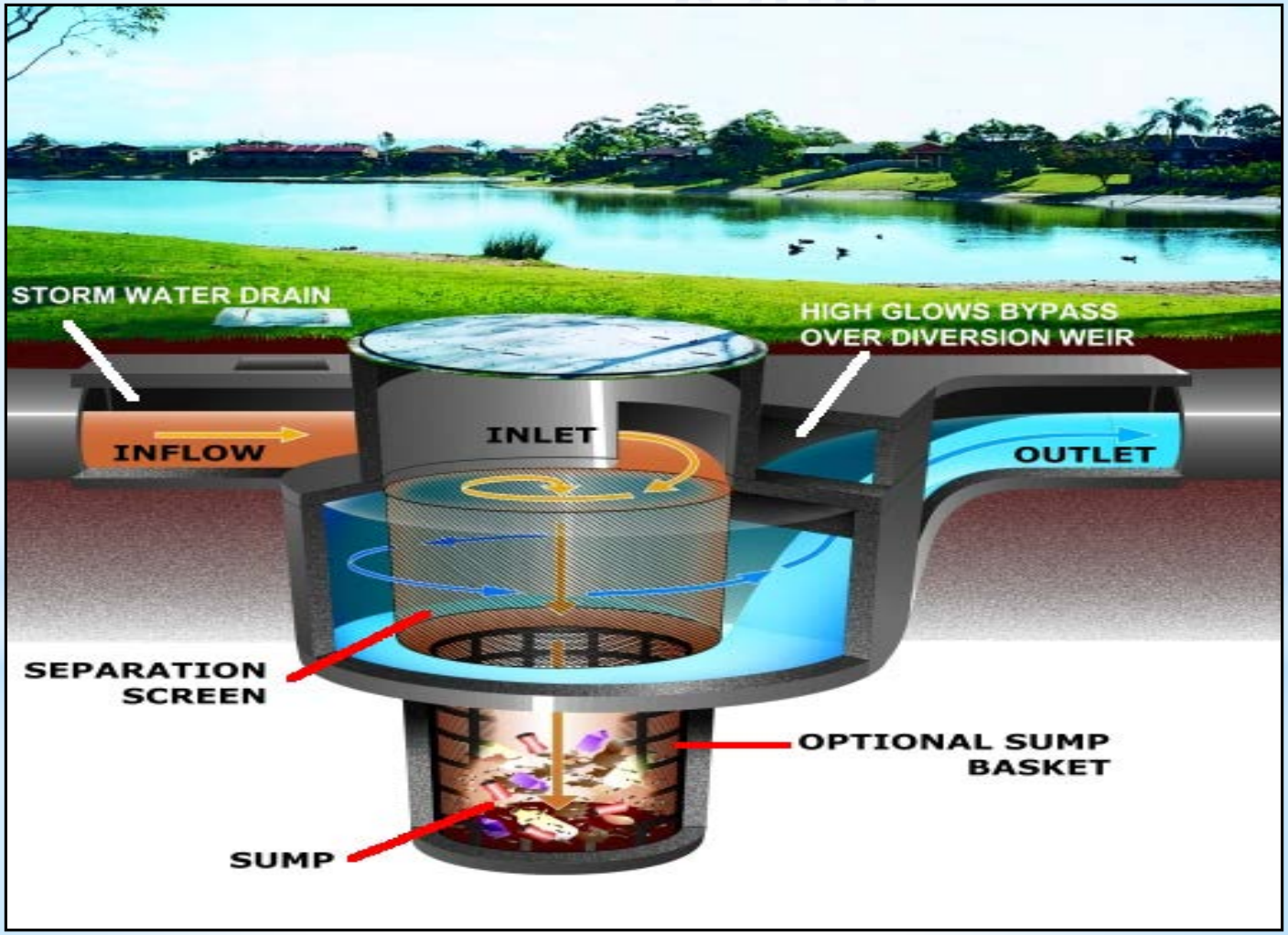
Temporary Stabilization

- Temporary stabilization measures must be installed within 14 days after construction activity temporarily stops
- However, where there is a rule, there is always an exception!
  - Snow cover or frozen ground
  - If earth disturbing activities will be resumed within 21 days

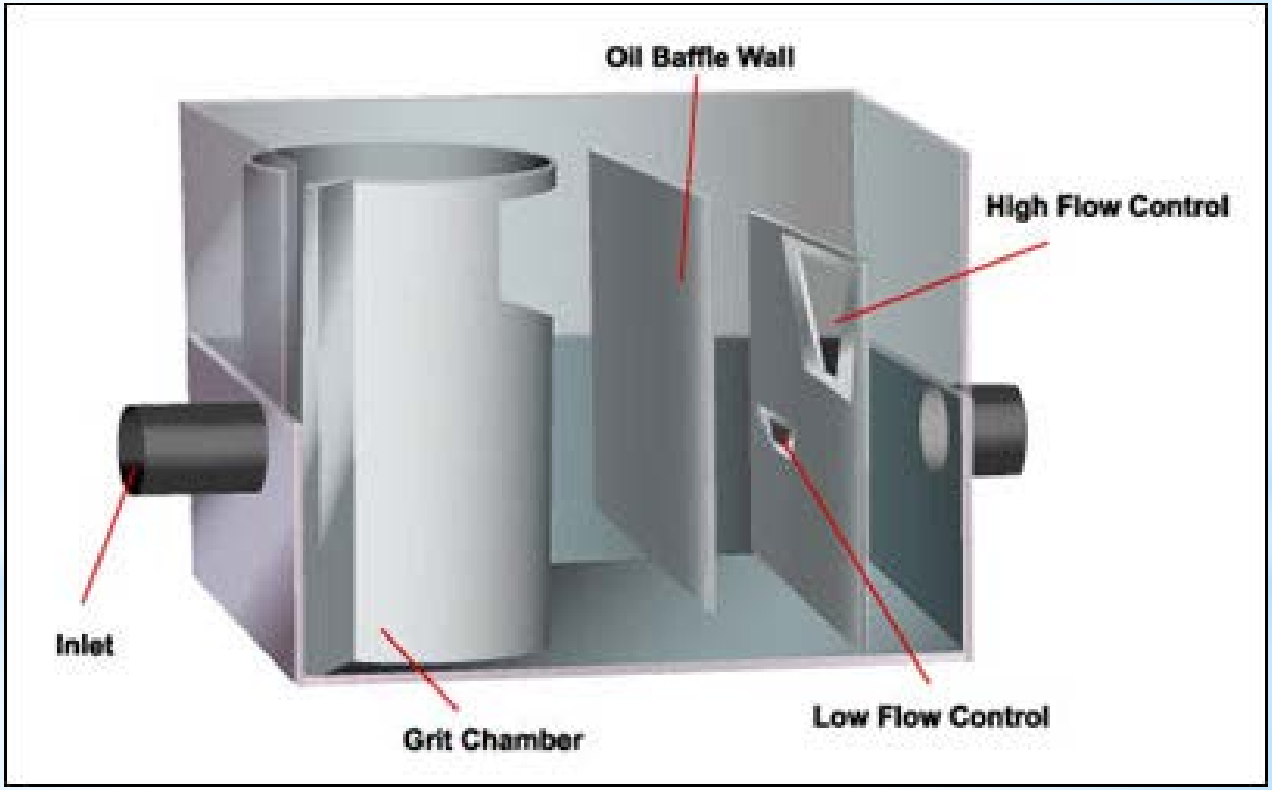
Post-Construction BMPs

- Examples
  - Stormwater Treatment Vaults
  - Detention/Infiltration Basins
  - Wetlands
- Need to discuss with maintenance prior to design & installation
- Must be regularly maintained

Stormwater Treatment Vault



Stormwater Treatment Vault



Detention/Infiltration Basins

Wetlands

Permanent Stabilization

- Start permanent stabilization measures ASAP after parts of project are complete
- All temporary BMPs must be removed
- Select the appropriate BMP for the area
- Can use rock mulch, riprap, landscaping or other form of landscaping
- Must have 70% of the pre-construction vegetation on the remaining DSA to achieve permanent stabilization

Challenges with Vegetative Cover

- Adequate vegetation establishment takes time in arid/semi-arid climates
- Mother Nature may not cooperate
- Poor revegetation design or poor implementation/installation

Notice of Change

- A Notice of Change (NOC) must be filed when the contractor has completed his work on the project and hands off the remaining work to NDOT
- Both parties sign the NOC before submitting it to NDEP
- NDOT then assumes liability for the permit
- NOC form can be found on NDEP's Stormwater Discharge Permits' webpage

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION DIVISION
M E M O R A N D U M

DATE: December 31, 2009
TO: Resident Engineers
FROM: Gary Selmi, Chief Construction Engineer

SUBJECT: Construction Division Procedure Memo #2007-002 (replaces #2006-004)
Relief of Maintenance (BMP's)

RELIEF OF MAINTENANCE (BMP'S)

The following applies to all projects requiring a General Permit for Storm Water Associated with Construction Activity.

The following items and actions must be completed prior to granting, Relief of Maintenance, requested by the contractor. These items and actions are in reference to the existing BMP's (Best Management Practices) that are to be left in-place at the conclusion of the contract and must remain in-place until the stabilization has reached an acceptable percentage as determined by the General Permit.

- The Resident Engineer shall contact the Department's Environmental Services Division and the Maintenance Manager for the location of the project and request a field review during the preparation of the punch list.
- The Environmental Division will provide a report, which identifies the approximate time to achieve acceptable stabilization.
- The Resident Engineer will provide a copy of the most current inspection reports (Form #040-054) for all BMP's to be left in-place. These inspection reports will include date of inspection, condition and location of BMP's. The BMP's to be left in-place will be brought up to an acceptable condition prior to the granting of Relief of Maintenance.
- The contractor shall provide a copy of the most current SWPPP. The most current SWPPP will be provided to the Maintenance Manager.

All of the above information shall be provided to the Maintenance Manager, for the location of the project, prior to granting Relief of Maintenance.

GS:JRC
cc: Rick Nelson, Asst. Director- Operations
Bill Hoffman, Chief Maintenance Engineer
Mary Martini, District Engineer-Las Vegas
Thor Dyson, District Engineer-Reno
Kevin Lee, District Engineer-Elko
Mohamed Rouas, Asst. District Engineer-Las Vegas
Dave Titzel, Asst. District Engineer-Reno
Mike Murphy, Asst. District Engineer-Elko
Dave Lindeman, Asst District Engineer-Winnemucca
Kathy Weaver, Asst. District Engineer-Ely
Reid Kaiser, Asst. Chief Construction Engineer
Jeff Shapiro, Asst. Chief Construction Engineer

Final Stabilization Geotextiles

Final Stabilization Hydroseeding

Final Stabilization
Rock Mulch

Notice of Termination

- The Notice of Termination (NOT) can be filed with NDEP when final stabilization requirements have been met and the temporary BMPs have been removed
- NDEP will send out an inspector to verify that all the permit requirements have been completed
- When NOT is approved, the permit can be closed

What if NDEP Doesn't Accept the NOT?

- NDOT (i.e. a local Maintenance Crew) will take over the stormwater permit
- NDOT is now the owner and operator (Relief of Maintenance)
- Environmental Services will contact NDEP
- The SWPPP must be maintained.
- Inspections must continue
- BMPs must be properly maintained until permanent stabilization is achieved

NDEP Contact Info

- **Stormwater Website:** http://ndep.nv.gov/bwpc/storm01.htm
- Steve McGoff: smcgoff@ndep.nv.gov 687-9429
- Mickie Reid: mreid@ndep.nv.gov 687-9434
- Chris Gravenstein: cgravenstein@ndep.nv.gov 687-9440

Questions or Comments?

Quiz #2

Municipal Storm Water Video

Maintenance Facilities

MS4 Permit

- NPDES permit issued by NDEP
- NDOT is categorized as a “Large MS4”
- Covers stormwater discharges into “waters of the U.S.” from all of NDOT’s infrastructure statewide
- NDOT is required to develop, implement and revise (as appropriate) a Stormwater Management Program (SWMP)

SWMP Components

- Legal Authority
- Stormwater Education Program
- MS4 Maps and Outfalls
- Discharges to Water Quality Impaired Waters and Sanitary Sewers
- Construction Site BMP Program
- New Development and Redevelopment Planning Program
- Illicit Discharge Detection and Elimination (IDDE) Program
- Industrial Facility Monitoring and Control
- NDOT Maintenance Facilities
- Public Street Maintenance Program
- Herbicide, Pesticide and Fertilizer Application Program

SWMP Requirements

- Training of Maintenance, Construction and Contractor personnel
- Public education
- Construction Stormwater Permits are obtained
  - NDOT is responsible for inspection oversight!
- Water Quality Monitoring
- Inventory, development and maintenance of post-construction BMPs
- Illicit Discharge Detection and Elimination (IDDE) Program

Types of Pollutants Found at Maintenance Yards

Gasoline/Diesel

Oils

Batteries

Paint Chips

Salt/Brine

Metals

Sediment

Facility Pollution Prevention Plans (FPPPs)

- Must prepare a separate FPPP for each of NDOT's maintenance facilities including:
  - Vehicle maintenance facilities
  - Solid waste transfer stations
  - Exposed stockpiles of materials
  - Sites used for snow dumps

FPPP Requirements

- Must designate as either a major or a minor facility
- Major facilities must have a runoff control plan that includes:
  - The activity description
  - Site map of the facility
  - Potential pollutant sources

Stormwater Management Controls

- Runoff control plan administrator
- Preventative maintenance
- Good housekeeping
- Spill prevention & response procedures
- BMPs for pollutant sources
- Evaluation for non-stormwater discharges
- Employee training
- Inspection procedures
- Summary of compliance

Minor Facilities

- Grouped together by type
- One runoff control plan can be developed for each type of facility
- Address, type of operation, size of the facility & the receiving waters
- Potential pollutant sources

Stormwater Management Controls

- Preventative maintenance measures
- Good housekeeping
- Spill prevention & response procedures
- BMPs
- Evaluation for non-stormwater discharges
- Inspection procedures

FPPP Requirements

- Major facility runoff control plans must be kept on-site
- Minor facility runoff control plans are kept on file at the District Office
- All facilities must be inspected annually by NDOT Enivironmental Services
- FPPPs are living documents and need to be amended as necessary

BMPs at Maintenance Yards

Wash Racks

Battery Storage

Used Oil Storage

Used Oil Storage

Sand-Oil Separators

Prevent Oil Spills

Proper Storage of Hoses

Cleaning Up Spills

Use Absorbent Pads

Keep Dry
Absorbent Handy

Use Drip Pans or Plastic Sheets

Good Housekeeping

- Work as much as possible indoors
- Keep materials covered, if possible
- Use secondary containment
- Sweep up on a regular basis
- Install the correct BMPs & keep them maintained

Good Housekeeping

Good Housekeeping

Poor Housekeeping

Poor Housekeeping

Poor Housekeeping

Salt Sheds & Material Stockpiles

- Keep stockpiles covered if possible
- If stored outside, use sediment logs to prevent runoff

Covered Salt Sheds

Uncovered Salt Stockpiles

Uncovered Salt Stockpile

Municipal Storm Water Video

Maintenance Facility Inspections

- Locations of discharges of sediment or other pollutants
- Location of BMPs that need to be maintained, failed to operate, or proved inadequate
- Location of any additional BMPs that did not exist at the time of the inspection
- Corrective actions required
- Identify all non-stormwater discharges
- Identify any material storage areas and the potential for pollutant runoff

Scope of Inspections

- Storage areas for vehicles & equipment
- Fueling areas
- Indoor/outdoor vehicle & equipment maintenance areas
- Material storage areas
- Material stockpiles
- Vehicle/equipment cleaning areas
- Onsite waste storage or disposal
- BMPs
- Site entrance/exit
- Outfalls

IDDE Video

Illicit Discharge Detection & Elimination (IDDE) Program (NS-6)

- During construction, report any illicit connection or discharge on the construction site to the RE
- Maintenance crews should report to their supervisor any suspicious flows from outfalls or in manholes
- RE or the maintenance supervisor will contact NDEP's spill hotline to report the illicit discharge. ALWAYS!!!

Illicit Discharges

- Look for debris or rubbish piles
- Visible signs of staining or unusual colors on the pavement
- Pungent odors coming from the drainage system
- Discoloration or oily sheens in the water

Illicit Discharge Detection & Elimination Program (NS-6)

- Mode of entry
  - Direct (sewage cross connections and straight pipe, etc.)
  - Indirect (spills, dumping, washing activities, irrigation/landscaping, etc.)
- Signs of an illicit discharge
  - “Dry weather” flows
  - Odor and color
  - Floatables
  - Location, e.g. adjacent to industrial areas

IDDE Examples

Oily sheen

IDDE Examples

Questions or Comments?

Final Exam

Note: 80% passing score required for Certification